Uva Wellassa University, Sri Lanka
Faculty of Science and Technology
Science and Technology Degree program
1st Semester Examination – March/April 2013

Uva Wellassa University

SCT 303-1 Mathematical Methods

Instructions to candidates

Answer all **Three (03)** questions

Time allocation: **One (01)** hour

Total marks allocated: 100

1.

a.

i. Find a vector parametrization for the line which passes through the points $(1, 2, 7)$and $(2, -3, 0)$

ii. Find the unit vector in the direction of $\vec{v} =< 3, -4 >$

b. Let $\vec{v} =< 1, -4, 0 >$ and $\vec{w} =< 1, 2, 3 >$. Then calculate followings

i. $3\vec{v} - 2\vec{w}$

ii. $\vec{v}.\vec{w}$

iii. $\vec{v} \times \vec{w}$

(40 marks)

2-1

2. Find the rate of change of pressure (in millibars per meter) at the point $Q = (1, 2, 1)$ in the direction of $\vec{v} =< 0, 1, 1 >$, where the pressure (in millibars) is given by

$$f(x, y, z) = 1000 + yz^2 + x^2z - xy^2$$

Where x, y, z in meters. *(Hint: use directional derivatives)*

(30 marks)

3.

a. Convert the complex number $Z = 1 + i$ into a polar form.

b. Use Green's theorem to evaluate

$$\int_C xydx + x^2y^3dy$$

Where C is the triangle with vertices (0,0),(1,0),(1,2) with positive orientation.

(30 marks)